

DISTRIBUTION AND ABUNDANCE OF JUVENILE COHO AND STEELHEAD IN  
WADDELL, SCOTT, AND GAZOS CREEKS IN 1992.

Dr. Jerry J. Smith  
Department of Biological Sciences  
San Jose State University  
San Jose, CA 95192

20 October 1992

## INTRODUCTION

Wild coho salmon (Oncorhynchus kisutch) reach their southernmost distribution in Scott and Waddell creeks in Santa Cruz County. The severe 2 year drought in 1975-76 and 1976-77, the floods in 1982, 1983 and 1986, the present 6 year drought, and various human-induced habitat problems have apparently significantly reduced wild coho at the southern end of their range. Because of the importance of maintaining this southern, late-spawning strain of coho, there has been considerable recent interest in the coho of Scott and Waddell creeks. However, only very limited data exist on the status of coho since the studies by Shapovalov and Taft (1954) from the 1930's.

In 1990-91 access to both Scott and Waddell creeks was restricted during most of the normal coho spawning period of December through February. Few adult fish are likely to have successfully spawned, due to the poor access and due to the weak year class in 1988 on Waddell Creek. Smolt trapping was conducted on both streams during part of the migration period in spring of 1992; no coho smolts were collected on Waddell Creek (Smith 1992), and only a small number (9) were collected by the Department of Fish and Game on Scott Creek. An adult migrant trap operated on Waddell Creek in winter of 1991-92 captured 31 adult coho, approximately half of the adult run (based upon recovery of marked carcasses). Most fish were "jack" (1 year ocean ) males, and only approximately 8 females were estimated for 1991-92 (Smith 1992). In addition, a substantial flood occurred in early February, apparently after most coho migration and spawning had occurred; many coho redds could have been damaged or destroyed. In Scott Creek limited diving collected only 1 female coho (but numerous males) for the enhancement hatchery on Big Creek.

Because of the need for data on the spawning and rearing success of coho, this study was undertaken to provide information on the distribution of juvenile coho and their relative abundance (compared to steelhead, O. mykiss) in Scott and Waddell creeks. Gazos Creek was also sampled, because coho have been present there in the past.

## METHODS

Previous studies of coho distribution in Scott and Waddell creeks in 1988 (Smith unpublished) found that coho occurred only in the low-gradient (<2 1/2 percent)

portions of the streams (primarily in Rosgen channel types C1, C3, C4, B3). Within sites, coho occurred in pools and glides with good depth and/or cover. Most of the sampling sites used in this study were in the low gradient stream sections likely to be utilized for coho. In West Waddell Creek, two steeper upstream sites were sampled to try to determine the upstream limit of coho rearing in 1992. All sampling was done in late July through early October, when coho and steelhead had probably reached their maximum size for the year and when electroshocking mortality would be low.

At each site 3 to 5 individual habitats were sampled by backpack electroshocker (Smith Root Type VII and VIII). Habitats sampled were primarily glides and medium depth (<3 feet) pools, and were selected because they appeared likely to be suitable for coho. Deeper pools, although preferred by coho, were generally not sampled, because of poor sampling efficiency in deep water with backpack shockers. The sampled habitats were not representative of the stream reach, but reflected a strong bias towards habitats likely to have coho (Tables 1-3). Thirteen sites and a total of 2858 feet of stream were sampled in the Waddell Creek watershed, thirteen sites and a total of 1624 feet were sampled in the Scott Creek watershed, and two sites with a total of 275 feet were sampled on Gazos Creek (Tables 1-3). Approximately 200 manhours were spent sampling Waddell Creek, 100 manhours sampling Scott Creek, and 16 manhours sampling Gazos Creek.

At each sample habitat block nets were used to prevent fish movement between habitats during sampling. Two to 3 passes with the electroshocker were normally used to ensure that most fish were collected. However, population estimates were not the goal of this study, so habitat sampling was often terminated without achieving depletion results sufficient for population estimates. The very low number of coho collected also restricted precise population estimates. In addition, we have found coho to be much more likely to be associated with cover, and to quickly seek cover when disturbed; coho are more difficult to collect in good habitat (deep habitats with cover) than are similar-sized steelhead.

Coho and steelhead collected at each habitat were measured in 5 mm standard length intervals and released. Steelhead were assigned to age groups based upon length-frequency patterns at each site. Because floating, flow-through live cars were used, capture and handling mortality was very low (less than 4 percent).

## RESULTS

### Waddell Creek

Coho were collected at 6 of the 13 sites sampled in the Waddell Creek watershed (Table 1). Highest apparent densities were on Waddell Creek immediately downstream of the East and West forks and on the West Fork, immediately upstream of the junction. A single coho was collected 0.6 miles downstream of the forks, but none were collected at the four other sites downstream of the forks. On the west fork, coho were collected at three other sites extending over 2 miles upstream of the forks (almost to Slippery Falls), but only a total of 4 coho were collected at the three sites. No coho were collected at the single site sampled

on the East Fork of Waddell Creek. In all, only 19 juvenile coho were collected in Waddell and West Waddell creeks, compared to 1505 juvenile steelhead collected in the watershed (Table 1).

#### Scott Creek

In the Scott Creek watershed coho were collected at 6 of the 13 sample sites (Table 2). However, coho were collected 1.9 mile upstream of Highway 1, and no sampling was done downstream of that site. In addition, 3 of the sample sites (sites 6-8) on upper Scott Creek were clustered very close together (total distance 0.38 miles), in order to determine the extent of coho after finding relatively high densities at site 7. No coho were captured at the single sites on lower Mill and Big creeks. Forty-two juvenile coho were collected in Scott Creek, including 35 in sites 6-8. As in Waddell Creek, coho were greatly outnumbered by steelhead, with steelhead 1266 collected.

Also of note was the presence of significant numbers of holdover hatchery steelhead smolts at the Big Creek and lowermost Scott Creek sites (Table 2).

#### Gazos Creek

Only two sites in the lower two miles of Gazos Creek were sampled, and no coho were collected (Table 3). Densities of young-of-the-year steelhead were very low, and age 2+ fish relatively abundant. Such results are usually found for resident rainbow trout populations, rather than for steelhead.

### DISCUSSION/ANALYSIS

#### Waddell Creek

At least 5 probable coho redds identified in January were apparently destroyed by scour or fill associated with the February storm. The absence of juvenile coho at the downstream sites suggests that coho spawning in the lower portion of the stream occurred prior to the February storm and those spawning redds were destroyed. The few scattered coho juveniles collected at the upper sites on the West Fork (between Slippery Falls and one-half mile above the forks) suggests partial destruction of redds due to the storm. Coho apparently did spawn as far upstream as Slippery Falls, even though spawning gravels are rare immediately downstream of the falls. In addition, summer habitat immediately downstream of the falls is steeper than preferred and does not include deep pools with woody cover.

No coho were collected at the single site on the lower portion of the East Fork. The East Fork is generally steeper than the West Fork, and low gradient habitat preferred by coho is rare except within 1/4 mile of the junction. The East Fork also appeared to have had higher February flood flows and more scouring of the stream channel than the West Fork.

The collection of 15 juvenile coho at sites on the lower West Fork and immediately below the junction suggests that successful spawning occurred on the lower West Fork after the February storm. In addition to the fish collected, juvenile coho were observed to be common in several of the deeper pools below the junction.

Slightly over 1/2 mile of habitat was sampled by electrofishing on a stream with perhaps 6 miles of suitable coho rearing habitat. Only 19 coho were collected, even though sampling was primarily done in individual habitats likely to have coho. However, coho are more difficult to catch than steelhead, and the deepest pools, most likely to have coho, were not sampled. Precise estimates of the number of juvenile coho in Waddell Creek cannot be made, but the results suggest that 1992 production of juvenile coho probably did not exceed the low to mid hundreds.

### Scott Creek

Two juvenile coho were taken from a single pool at the uppermost sample site on Scott Creek, but no coho were collected at a site only 0.15 miles further downstream. Only one coho was collected between miles 2.55 and 4.25. As on Waddell Creek, it is likely that most of the coho spawned prior to the February storm, and their redds were destroyed or damaged.

Most (35/42) of the coho caught in the Scott Creek watershed were at three sites spanning only 0.38 miles of stream (Table 2). Less than 0.4 miles below the lowermost of the 3 sites no coho were collected. Only 1 coho juvenile was collected 0.15 miles upstream of the uppermost of the 3 sites. These results suggest that successful spawning occurred after the February storm near mile 5.0, but juvenile coho remained near the redd site(s), and most rearing on upper Scott Creek was confined to less than 3/4 miles of stream.

Juvenile coho also were collected on Scott Creek near the mouth of Little Creek. Late spawning fish may also have resulted in significant coho rearing on the lower portion of Scott Creek.

No juvenile coho were collected at sites on the lower part of Big and Mill creeks in 1992. Most of Big Creek is steeper than preferred coho habitat, but juvenile coho were present at the sample site (and 1/2 mile upstream) in 1988. Coho were also collected in 1988 at several sites on lower Mill Creek. The absence of juvenile coho this year at the Big Creek site and Mill Creek site suggests, that if coho spawned on those streams, their redds were destroyed by the February flood.

We collected over twice as many coho on Scott Creek as on Waddell in 1992, but only 42 coho were collected compared to 1266 steelhead. Total length of stream sampled on Scott was only slightly more than 1/2 of that sampled on Waddell. Despite the somewhat better results on Scott Creek, total coho production in 1992 was probably less than one thousand fish.

### Gazos Creek

No coho were collected on Gazos Creek, but only two sites were sampled. The low-gradient, well-shaded habitat appeared suitable for coho, but pools were relatively scarce on this relatively small stream. The age-structure of the "steelhead" was suggestive of resident trout; there may be barrier problems on lower Gazos Creek.

## SUMMARY/CONCLUSIONS

Relatively few juvenile coho reared on Scott and Waddell creeks in 1992. Only 19 juvenile coho were collected on Waddell Creek and 42 coho collected on Scott Creek, compared to 1505 and 1266 steelhead. Apparently relatively few, scattered coho were produced by fish spawning prior to the February floods. Some spawning in both streams occurred after the floods and produced a few local concentrations of juvenile coho. Coho smolt production is likely to be in the hundreds, rather than in the thousands. No coho were collected by limited sampling on Gazos Creek.

## ACKNOWLEDGMENTS

A grant from the Waddell Creek Association paid for part of the sampling time by students (Lanette Sanders and John Stanziano) on Waddell Creek. John Mott of the California Department of Parks and Recreation arranged for the use of the Rancho Del Oso Nature Center as lodging during the sampling on Waddell Creek. Permission for sampling on portions of Scott Creek was granted by Bud McCrary and Al Smith.

In addition to Lanette Sanders and John Stanziano, who did the majority of the Waddell Creek sampling, the following people helped with the electroshock fish sampling: Jae Abel, Don Alley, Jim Butera, Margaret Roper and Greg Schlick.

## LITERATURE CITED

- Shapovalov, L. and A. C. Taft. 1954. The life histories of the steelhead rainbow trout (Salmo gairdneri gairdneri) and silver salmon (Oncorhynchus kisutch). California Department of Fish and Game Bulletin 98. 275 pp.
- Smith, J. J. 1992. Summary of trapping results on Waddell Creek for 1991-1992. 11 page unpublished report.

Table 1. Site locations, habitat types present and sampled, and number of steelhead and coho collected at sites on Waddell Creek in July and August 1992.

[illegible]

Table 2. Site locations, habitat types present and sampled, and number of steelhead and coho collected at sites on Scott Creek in August, September and October 1992.

Site	Mile >Hwy1	Chan Type	%Hab Avail				%Hab Sampl			Sample Length	#SHT 0+	#Coho 1+	
PL	GL	RN	RF	PL	GL	RN	PL	GL	RN				
1 <Little Creek	1.9	C1	25	50	15	10	51	44	5	202'	85	12*	3
Big Creek	2.15												
2 Pullout >Big Cr.	2.55	C3	35	35	25	5	73	27		131	72	23	
3 <Mill Creek	3.3	C3	30	45	20	5	46	50	4	140	129	20	1
4 <Swanton Road	3.55	C3	40	40	15	5	81	19		94	116	19	
5 Cattle Guard	4.25	C3	45	30	10	15	83	17		115	106	14	
6 Side Rd Junction	4.62	C3	35	35	15	15	68	32		116	72	6	7
7 Pullout <Big Cr. Gate	4.9	C3	30	50	10	10	71	12	17	98	107	18	17
8 Big Cr. Gate	5.0	C3	25	55	5	15	43	57		106	42	9	11
9 0.15 mi > bridge	5.15	C3	15	55	20	10	53	38	9	80	37	20	1
10 <Upper Ford	5.70	C3	45	35	10	10	63	37		154	87	35	
11 Upper Ford	5.85	C1	35	50	10	5	54	34	12	121	56	14	2
12 Big Cr. Swanton Rd.		C1	20	20	35	25	73	27		166	56	27**	
13 Mill Cr. <Swanton Rd.		C1	45	25	15	15	95	5		101	77	7	
Totals			32	41	16	11	66	30	4	1624'	1042	224	42
											1266		

\*\*Includes 10 holdover hatchery smolts

\*Includes 5 holdover hatchery smolts



Table 3. Site locations, habitat types present and sampled, and number of steelhead and coho collected at sites on Gazos Creek in August 1992.

Site	Mile >Hwy1	Chan Type	%Hab Avail				%Hab Sampl			Sample Length	#SHT		#Coho
			PL	GL	RN	RF	PL	GL	RN		0+	1+	
1	0.9	C3	15	55	20	10	57	43		148'	30	23	
2	1.8	C3	15	55	20	10	31	69		127	45	14	
Totals										275'	75	37	